

# Health Survey Results

of Current and Former DISH/Clark,  
Texas Residents

EARTHWORKS' OIL AND GAS  
ACCOUNTABILITY PROJECT



Texas Oil & Gas

**Accountability** Project

# **Results of Health Survey of Current and Former DISH/Clark, Texas Residents**

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## Executive Summary

The following health survey for DISH, Texas residents was compiled by Wilma Subra on behalf of Earthworks' Oil & Gas Accountability Project. The health survey was completed by a total of 31 individuals between the ages of 4 and 69 during October and November of 2009. Participants consisted of 30 current residents and one previous resident of DISH, Texas.

Of the population surveyed 19% considered themselves to be sick, or both healthy and sick. 81% considered themselves to be healthy. However, 39% of the population reported frequency of illness on average of three days per week and five days per month with a maximum of seven days per week and all days of the month. Participants reported 130 medical conditions and of the conditions the survey identifies 23 most prevalent medical conditions. 71% of participants reported having respiratory ailments.

### Notable results from the survey include:

1. A summary of odor events experienced by participants, odor frequencies and possible odor sources, and
2. A comparison of health effects reported by the community with the known effects of chemicals found in the DISH area by Wolf Eagle Environmental in August of 2009.

First, 28 of the 31 individuals surveyed experienced odor events. Frequency of odor events ranged from one to two times per day to 24 days per month. Participants associated odors with specific facilities in the DISH area including, compressor stations, gas processing plants and metering stations, natural gas pipelines, gas wells, sewer systems and pastures.

Second, the human health impacts reported during the survey were compared to the health impacts associated with toxic air emission chemicals detected in the ambient air of DISH in August 2009, in excess of TCEQ screening levels. 61% of the health impacts reported by participants are known health effects of chemicals detected in the air by Wolf Eagle Environmental in August 2009. These chemicals include

- Volatile Organic Chemicals,
- Hazardous Air Pollutants, and
- Tentatively Identified Compounds.

The health effects associated with these chemicals and reported by the survey participants are included below.

# 61%

**Health effects reported by the DISH community were associated with toxics measured in excess of TCEQ screening levels**

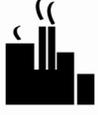
Abnormal EEG  
Brain disorders  
Bronchitis  
Chronic Eye Irritation  
Decreased Motor Skills  
Depression  
Dizziness  
Eyes Burning  
Falling, Staggering  
Frequent Irritation  
Frequent Nausea  
Increased Fatigue  
Irregular/Rapid Heart Beat  
Muscle Aches & Pains  
Nasal Irritation  
Pre-Cancerous Lesions  
Severe Anxiety  
Severe Headaches  
Sinus Problems  
Throat Irritation  
Tired  
Weakness  
Allergies  
Difficulty in Concentrating  
Easy Bruising  
Nervous System Impacts  
Difficulty in Breathing

**Recommendations based on this survey include:**

- Community health investigation and long-term tracking by the Texas Department of State Health Services,
- Community-based documentation and tracking of odors and symptoms by Texas Commission on Environmental Quality,
- Increased tracking of operational upsets, spills, releases and permit violations of oil and gas infrastructure by both the Texas Commission on Environmental Quality and Texas Railroad commission, and
- The continuous monitoring of area emissions by Texas Commission on Environmental Quality.

**Odors Associated with Sources in the DISH Area**

Individuals responding to the health survey reported odors associated with specific types of facilities in the DISH area:

					
gas wells	natural gas pipelines	compressor stations	gas processing plants / metering stations	sewer	pastures
Natural gas smell	Odorized natural gas	Sulfur smell Odorized natural gas Ozone Burnt butter	Sulfur smell Odorized natural gas Burnt wire Strong chemical like smell Ether	Septic odors	Hay and grass smells
<b>REPORTED EFFECTS</b> headaches nausea sinus problems asthma	<b>REPORTED EFFECTS</b> headaches nausea sinus problems asthma	<b>REPORTED EFFECTS</b> burning eyes nausea headaches running nose sore throat asthma sinus problems	<b>REPORTED EFFECTS</b> burning eyes nausea headaches running nose sore throat asthma sinus problems bronchitis	<b>REPORTED EFFECTS</b> infection of airways irritation of sinus and throat	

**Duration of Health Impacts**

Associated with odor events

Airway Infection .....	1-3 weeks
Allergies.....	24 hours after odors dissipates
Bronchitis.....	1 week
Burning and Irritated Throat .....	Until smell goes away
Chest Congestion .....	1-3 days
Hard to Breathe.....	2-3 days
Headache .....	4 hours to one week
Irritated Eyes .....	1-2 days
Nasal Irritation .....	1 week
Nausea .....	Until smell goes away
Respiratory Irritation .....	24 hours after odor dissipates
Sinus Irritation .....	1-3 days
Sinus with Plugged Ears.....	10-20 days

**Odor events were reported to be as often as twice per day.**

## Introduction

A health survey instrument for current and former DISH/Clark, Texas residents was compiled by Wilma Subra of Subra Company on behalf of EARTHWORKS' Oil and Gas Accountability Project. The health survey instrument was distributed to current and former DISH/Clark residents. The health survey forms were filled out during the months of October and November 2009. The results of the health survey were evaluated by Wilma Subra of Subra Company.

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## Health Survey Participants

A total of 31 individuals between the ages of 4 and 69 participated in the health survey. The individuals consisted of 30 current residents of DISH/Clark and one previous resident of DISH/Clark. Fourteen households were surveyed. The individuals participating in the survey consisted of 15 females and 16 males.

## Participant Ages

- 31 Total Participants between the ages of 4 and 69
- 15 Females between the ages of 19 and 67
- 16 Males between the ages of 4 and 69

Age Range	Number of Females	Number of Males
0-5	0	2
6-10	0	2
11-15	0	1
16-20	1	0
21-30	1	1
31-40	3	2
41-50	4	3
51-60	4	3
61-70	2	2

## Years Lived in DISH/Clark

The 31 participants in the survey lived in DISH/Clark an average of 8.5 years and ranged from three months to 25 years. One of the 31 individuals surveyed had lived in DISH for four years but had relocated 5 months prior to the survey.

## General Health of Individuals Surveyed

Of the total of 31 individuals surveyed, 21 considered themselves healthy, 4 individuals considered themselves sick and one individual, both healthy and sick. Five individuals did not respond to this question.

## General Health

21 Individuals between the ages of 4 and 69	Healthy	81%
4 Individuals between the ages of 5 and 59	Sick	15%
1 individual age 49	Healthy and Sick	4%

### Females

11 Individuals between the ages 19 and 64	Healthy	92%
1 Individual age 26	Sick	8%

### Males

10 Individuals between the ages of 4 and 69	Healthy	72%
3 Individuals between the ages of 5 and 59	Sick	21%
1 Individual age 49	Healthy and Sick	7%

## Frequency of Illness

The four individuals who reported their general health as sick, reported the frequency of their illnesses as three to seven days per week, and one day, two days and every day per month. The individual who reported his general health as healthy and sick, reported the frequency of his illness as one day per week and three days per month.

Six of the 21 individuals who reported their general health as healthy, reported their frequency of illness as seven days per week and one, two and four days per month. Two of the five individuals who did not report their general health as healthy or sick, responded to the frequency of their illness as two days per month and up to five days per month.

Thus, even though 21 of the 31 individuals surveyed reported their general health as healthy, six individuals reported their frequency of illness as much as four days per month and seven days per week. Two of the five individuals who did not report the condition of their general health, reported their frequency of illness as two to five days per month. Thus 12 of the 31 individuals survey (39% of the population surveyed) reported frequency of illnesses on average of three days per week and five days per month with a maximum of seven days per week and all days per month.

## Access to Doctors and Health Care Providers

Of the 31 individuals responding to the survey, 30 individuals (97%) had access to doctors. Twenty-six of 31 individuals (84%) had access to other health care providers, four individuals did not and one individual did not respond.

## Occupational Exposure

Four of the 31 individuals surveyed reported occupational exposure. None of the individuals surveyed reported exposure to chemicals from family member work places transported into their homes.

Two individuals employed as air craft mechanics (68 year old male and 37 year old male) reported exposure to jet fuel (25 years and 13 years), ammonia (23 years), acetone (23 years) and MEK (3 years). One individual, employed as a truck driver (49 year old male), reported exposure to creosote (1 year) and hydrochloric acid (1 year). The fourth individual (36 year

old female) reported occupational exposure to anesthetics - Isoflurene and cleaners - Rocal and Parvosal for 11 years.

One air craft mechanic reported his general health as healthy, the other did not respond to the general health question. The truck driver reported his general health as both healthy and sick. The female reported her general health as healthy.

## **Smoking History**

A total of 14 households were surveyed. Seven of the 14 households were nonsmoking households. Four households were occupied by smokers and three households were occupied by past smokers.

Twenty of the 31 individuals surveyed have never smoked. Seventeen of the twenty individuals did not have any other member of the household that smoked. Three individuals, who have never smoked, have other members of the household who are smokers eight individuals currently smoke, two individuals had smoked in the past and one individual did not provide information on smoking history.

The eight individuals who are current smokers have smoked for two to 34 years with an average smoking history of 23 years. Six of the current smokers are long term smokers who have smoked for 20 to 34 years. The smokers currently smoke a half to two packs of cigarettes per day.

The eight current smokers consist of five males and three females. The five males range in age from 22 to 59 and have smoked from two to 30 years. The three females who are current smokers range in age from 50 to 55 and have smoked for 20 to 34 years.

The two past smokers are 48 and 68 year old males who had smoked a pack to a pack and a half of cigarettes per day for 15 and 20 years.

## Odors and Associated Health Impacts

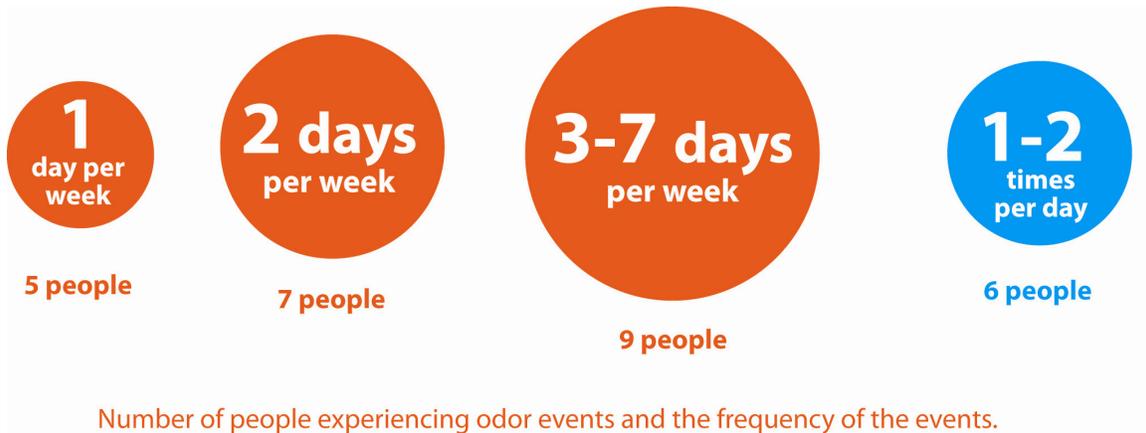
### Odor Events

Twenty-eight of the 31 individuals surveyed experienced odor events. Three individuals did not report experiencing odor events.

### Frequency of Odor Events and Number of Individuals Experiencing the Odor Events

Frequency of Odor Events	Individuals Experiencing Events
1-2 times per day	6
1 day per week	5
2 days per week	7
3 days per week	4
6 days per week	1
7 days per week	4
2 days per month	4
3 days per month	4
5 days per month	3
10 days per month	4
12 days per month	2
20 days per month	3
24 days per month	1

Note: Odors are more predominant when the wind is out of the south.



## **Odors Associated with Sources in the DISH Area**

Individuals responding to the health survey reported odors associated with specific types of facilities in the DISH area.

### **Compressor Stations**

- Sulfur
- Odorized Natural Gas Smell
- Ozone
- Burnt Butter Smell

### **Gas Processing Plants/Gas Metering Stations**

- Sulfur
- Odorized Natural Gas Smell
- Burnt Wire
- Strong Chemical Like Smell
- Ether

### **Natural Gas Pipe Lines**

- Odorized Natural Gas

### **Gas Wells**

- Natural Gas Smell

### **Sewer System**

- Septic odors

### **Pastures**

- Hay and Grass Smells

## **Health Impacts Associated with Odor Events**

### **Sulfur, Rotten Egg Smell**

- Burning Eyes
- Nausea
- Headaches
- Runny Nose
- Sore Throat
- Asthma
- Sinus Problems

### **Odorized Natural Gas**

- Headaches
- Nausea
- Chronic Sinus Infections
- Asthma
- Hypertension
- Indigestion

### **Burnt Wire**

- Burning Throat

### **Ether**

- Bronchitis

### Sewer Smell

- Infection of air ways
- Irritation of sinus and throat

### Duration of Health Impacts Associated with Odor Events

Health Impact	Duration of Health Impacts
Airway Infection	1-3 weeks
Allergies	24 hours after odors dissipates
Bronchitis	1 week
Burning and Irritated Throat	Until smell goes away
Chest Congestion	1-3 days
Hard to Breathe	2-3 days
Headache	4 hours to one week
Irritated Eyes	1-2 days
Nasal Irritation	1 week
Nausea	Until smell goes away
Respiratory Irritation	24 hours after odor dissipates
Sinus Irritation	1-3 days
Sinus with Plugged Ears	10-20 days

### Distance from Surveyed Households to Compressor Stations and Gas Processing Plants/Gas Metering Stations

Distance	Number of Households
50 Feet	1
100 Feet or less	3
600 Feet	1
1,000 Feet	2
0.5 miles	3
Less than 1 mile	1
1 to 2 miles	1

Note: Two households surveyed did not report distances.

### Medical Conditions Reported in the DISH/Clark Health Survey

In addition to the requested information concerning odor events and related health impacts, the health survey requested information on specific medical symptoms and diseases from each individual completing the survey. The symptoms reported in the odor events and related health impacts section of the survey were specifically requested to be included in this section of the survey.

A total of 165 medical symptoms and diseases were reported by the 31 individuals who completed the DISH/Clark Health Survey forms. Twenty-three medical conditions were the

most prevalent conditions reported by the 31 individuals surveyed in the DISH/Clark Health Survey.

<b>Medical Condition</b>	<b># of Individuals Surveyed</b>	<b>% of Individuals Surveyed</b>
Sinus Problems	18	58
Throat Irritation	17	55
Allergies	17	55
Weakness and Fatigue	17	55
Eye Irritation	16	52
Nasal Irritation	15	48
Joint Pain	14	45
Muscle Aches and Pains	13	42
Breathing Difficulties	13	42
Vision Impairment	13	42
Severe Headaches	12	39
Sleep Disturbances	12	39
Swollen and Painful Joints	12	39
Frequent Irritation	10	32
Skin Irritation	10	32
Wheezing	9	29
Frequent Nausea	9	29
ringing in Ears	9	29
Decreased Motor Skills	8	26
Loss of Sexual Drive	8	26
Bronchitis	7	23
Easy Bruising	7	23
Difficulty in Concentrating	7	23

In addition to these 23 most prevalent medical conditions, the survey identified more than 130 medical conditions and medical symptoms each occurring in a small number of individuals. Two females have neurological conditions - neuromuscular disorder, dystonia and muscular/skeletal disorder. Additional medical conditions occurring in a small number of individuals range from lung, liver and kidney disorders, brain disorders, strokes, thyroid problems, internal bleeding, frequent nose bleeds, and bone conditions, to high blood pressure, depression, anxiety, tremors, and behavioral changes.

A preliminary review of the first initial group of health surveys obtained on October 12, 2009, resulted in the following health conditions being reported by individuals completing the health survey. The results of the preliminary review were consistent with the medical conditions identified by the entire 31 individuals completing the survey.

## Health Effects Reported by DISH Community as of October 12, 2009

Abnormal EEG*	Abnormal Mammogram	Allergies
Amnesia	Brain Disorders*	Bronchitis*
Chronic Eye Irritation*	Decreased Motor Skills*	Depression*
Difficulty in Concentrating	Dizziness*	Easy Bruising
Endometriosis	Enlarged Spleen	Excessive Sweating
Eyes Burning*	Falling, Staggering*	Forgetfulness
Frequent Irritation*	Frequent Nausea*	Frequent Nose Bleeds
Increased Fatigue*	Irregular/Rapid Heart Beat*	Joint Pain
Lump in Breast	Muscle Aches & Pains*	Nasal Irritation*
Nervous System Impacts	Persistent Cough	Pre-Cancerous Lesions*
Ringing in Ears	Severe Anxiety*	Severe Headaches*
Shortness of Breath	Sinus Problems*	Sleep Disturbances
Sores & Ulcers Mouth	Strokes	Throat Irritation*
Thyroid Problems	Urinary Infections	Weakness* & Tired*

\*Health Impacts Associated with Chemicals present in Excess of TCEQ Short and Long Term Effects Screening Levels in the air of DISH

## Respiratory Impacts

Twenty-two of the 31 individuals surveyed (71%) reported having respiratory ailments.

Sinus Problems	18/31	58%
Throat Irritation	17/31	55%
Breathing Difficulties	13/31	42%
Wheezing	9/31	29%
Bronchitis	7/31	23%
<b>TOTAL</b>	<b>22/31</b>	<b>71%</b>

## Respiratory Impacts as it Relates to Smokers and Non-Smokers

Of the 22 individuals that had respiratory ailments, 12 never smoked, 8 were current smokers, one had smoked in the past, and 1 individual did not respond to the smoking request for information. Overall, 20 individuals of the 31 individuals surveyed had never smoked.

Therefore 60% of the nonsmokers surveyed had respiratory problems. Overall 8 individuals were current smokers; therefore 100% of the current smokers had respiratory problems. Overall 2 individuals had smoked in the past. Thus, 50% of the previous smokers had respiratory problems.

## Individuals with Most Medical Conditions

The 31 individuals surveyed had an average of 20.5 medical conditions reported in the Health Surveys (range 0 to 46). The individuals with the largest number of reported health symptoms were a 49 year old male and a 55 year old female. They each reported 46 medical conditions. The 49 year old male, a nonsmoker truck driver, reported his general health as sick and healthy and reported being sick one day per week and three days per month. He also reported experiencing odor events once per day, one day per week and 12 days per month. The 55 year old female reported her health as healthy, did not report the number of times sick

and listed odor events as two days per month. She is a smoker and has smoked for 30 plus years.

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### **Correlation of Chemicals Detected in the Ambient Air of DISH with the Health Impacts Experienced by Community Members in DISH/Clark**

Wolf Eagle Environmental sampled the ambient air in DISH at seven locations from August 17 to 18, 2009. The air samples were analyzed for Volatile Organic Chemicals, Hazardous Air Pollutants, Tentatively Identified Compounds and NOX. Sixteen chemicals were detected in the ambient air of DISH in excess of Texas Commission on Environmental Quality (TCEQ) Short-term and Long-term Effects Screening Levels. These chemicals consisted of Benzene, Carbon Disulfide, 1,2,4-Trimethylbenzene, Xylene, Naphthalene, Carbonyl Sulfide, Trimethyl Benzene, Methyl-Methylethyl Benzene, Tetramethyl Benzene, Methyl Pyridine, Dimethyl Disulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide, Diemethyl Pyridine, and Diethyl Benzene. The health impacts associated with the chemicals detected in the air of DISH in excess of TCEQ Short-term and Long-term Effects Screening Levels correspond to the health impacts being experienced by DISH community members.

### **Human Health Effects Associated with Chemicals Detected in the air in Excess of TCEQ Short and Long-Term Effects Screening Levels**

#### **Acute Health Effects**

Irritates skin, eyes, nose, throat and lungs  
Headaches  
Dizziness, Light Headed  
Nausea, Vomiting  
Skin Rashes  
Fatigue  
Tense and Nervous  
Personality Changes  
Depression, Anxiety, Irritability  
Confusion  
Drowsiness  
Weakness  
Muscle Cramps  
Irregular Heartbeat (arrhythmia)

#### **Chronic Health Effects**

Damage to Liver and Kidneys  
Damage to lungs  
Damage to Developing Fetus  
Causes Reproductive Damage  
Damages Nerves Causing Weakness and Poor Coordination  
Affects Nervous System  
Affects the Brain  
Leukemia  
Aplastic Anemia  
Changes in Blood Cells  
Affects Blood Clotting Ability  
Carcinogen  
Mutagen  
Teratogen — Developmental Malformations

The most prevalent health impacts reported by individuals surveyed during the Health Survey and the health impacts associated with odor events correspond to the health effects of chemicals detected in the air in DISH in excess of the TCEQ Short-term and Long-term Effects Screening Levels.

**Most Prevalent Health Impacts and Health Impacts Associated with Odor Events With the associated chemicals known to cause those health impact. These chemicals exceeded TCEQ short-term and long-term effects screening levels in the air of DISH.**

**Allergies**

Benzene, Xylenes, Naphthalene, Trimethyl Benzene, Diethyl Benzene, Carbonyl Sulfide, Dimethyl Disulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**Breathing Difficulties**

Benzene, Xylenes, Naphthalene, Trimethyl Benzene, Methyl-Methylethyl Benzene, Tetramethyl Benzene, Diethyl Benzene, Carbonyl Sulfide, Dimethyl Disulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**Bronchitis**

Trimethyl Benzene

**Difficulty in Concentrating**

Naphthalene

**Easy Bruising**

Benzene

**Eye Irritation**

Benzene, Xylenes, Naphthalene, Trimethyl Benzene, Methyl-Methylethyl Benzene, Tetramethyl Benzene, Diethyl Benzene, Carbon Disulfide, Carbonyl Sulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**Frequent Irritation**

Carbon Disulfide

**Frequent Nausea**

Benzene, Xylenes, Naphthalene, Diethyl Benzene, Carbon Disulfide, Carbonyl Sulfide, Dimethyl Disulfide, Methyl Pyridine, Dimethyl Pyridine

**Muscle Aches and Pains**

Carbonyl Sulfide

**Nasal Irritation**

Benzene, Xylenes, Naphthalene, Diethyl Benzene, Carbonyl Sulfide, Dimethyl Disulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**Severe Headaches**

Benzene, Xylenes, Naphthalene, Trimethyl Benzene, Methyl-Methylethyl Benzene, Tetramethyl Benzene, Diethyl Benzene, Carbon Disulfide, Methyl Pyridine, Dimethyl Pyridine

**Sinus Problems**

Benzene, Xylenes, Naphthalene, Diethyl Benzene, Carbonyl Sulfide, Dimethyl Disulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**61%**

**Health effects reported by the DISH community were associated with toxics measured in excess of TCEQ screening levels**

- Abnormal EEG
- Brain disorders
- Bronchitis
- Chronic Eye Irritation
- Decreased Motor Skills
- Depression
- Dizziness
- Eyes Burning
- Falling, Staggering
- Frequent Irritation
- Frequent Nausea
- Increased Fatigue
- Irregular/Rapid Heart Beat
- Muscle Aches & Pains
- Nasal Irritation
- Pre-Cancerous Lesions
- Severe Anxiety
- Severe Headaches
- Sinus Problems
- Throat Irritation
- Tired
- Weakness
- Allergies
- Difficulty in Concentrating
- Easy Bruising
- Nervous System Impacts
- Difficulty in Breathing



**Skin Irritation**

Benzene, Xylenes, Naphthalene, Trimethyl Benzene, Methyl-Methylethyl Benzene, Tetramethyl Benzene, Diethyl Benzene, Carbon Disulfide, Carbonyl Sulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**Throat Irritation**

Benzene, Xylenes, Naphthalene, Trimethyl, Benzene, Methyl-Methylethyl Benzene, Tetramethyl Benzene, Diethyl Benzene, Carbonyl, Sulfide, Dimethyl Disulfide, Methyl Ethyl Disulphide, Ethyl-Methylethyl Disulfide

**Vision Impairment**

Carbonyl Sulfide, Naphthalene

**Weakness and Fatigue**

Carbonyl Sulfide, Carbon Disulfide, Dimethyl Disulfide, Naphthalene

These chemicals exceeded TCEQ short-term and long-term levels in the air of DISH, TX

The medical conditions reported by DISH community members in the Health Survey correspond to the health conditions associated with the toxic air pollutants present in the air of DISH during August 2009 in excess of the TCEQ Short-term and Long-term Effects Screening Levels.

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**Summary**

Thirty-one individuals (15 females and 16 males) completed the DISH/Clark Health Survey. Thirty individuals were current residents of DISH/Clark and one was a previous resident. Fourteen households were surveyed.

Eighty-one percent of the individuals surveyed considered themselves healthy, 15% sick and 4% both healthy and sick. Thirty-nine percent of the population surveyed reported frequency of illnesses an average of three days per week and five days per month, with a maximum of seven days per week and all days per month.

Twenty-eight of the 31 individuals surveyed experienced odor events. The frequency of odor events occurred up to 7 days per week and 24 days per month. Odors were more predominant when the wind was out of the south, transporting emissions from the area of the compressor stations and gas plants towards the residential areas of DISH.

The individuals surveyed identified the sources of odors as compressor stations, gas processing plants/gas metering stations, natural gas lines, gas wells, sewer system and pastures. The community members identified substantial health impacts due to odor events associated with the compressor stations, gas processing plants and gas metering stations. These sources were identified as being located 50, 100, 600, and 1,000 feet from most of the homes surveyed and 0.5 to 2 miles from other surveyed homes.

A total of 165 medical symptoms and diseases were reported by the 31 individuals who completed the DISH/Clark Health Survey forms. Twenty-three medical conditions were the most prevalent conditions reported by the 31 individuals surveyed. These most prevalent health conditions included sinus problems, throat irritation, allergies, weakness and fatigue, eye irritation, nasal irritation, joint pain, muscle aches and pains, breathing difficulties, vision impairment, severe headaches, sleep disturbances, swollen and painful joints, frequent irritation, skin irritation, wheezing, frequent nausea, ringing in ears, decreased motor skills, loss

of sexual drive, bronchitis, easy bruising and difficulty in concentrating. In addition to these 23 most prevalent medical conditions, the survey identified more than 130 medical conditions and medical symptoms each occurring in a small number of individuals. Two females have neurological conditions - neuromuscular disorder, dystonia and muscular/skeletal disorder. Additional medical conditions occurring in a small number of individuals each, range from lung, liver and kidney disorders, brain disorders, strokes, thyroid problems internal bleeding, frequent nose bleeds, and bone conditions, to high blood pressure, depression, anxiety, tremors, and behavioral changes. Twenty-two of the 31 individuals surveyed (71%) reported having respiratory ailments.

The human health impacts reported during the survey were compared to the health impacts associated with the toxic air emission chemicals detected in the ambient air of DISH in August 2009, in excess of TCEQ Short-term and Long-term Effects Screening Levels. The medical conditions reported by DISH community members in the Health Survey correspond to the health conditions associated with the toxic air pollutants present in the ambient air of DISH during August 2009 in excess of the TCEQ Short-term and Long-term Effects Screening Levels.

## **Recommendations**

In order to further evaluate the health impacts being experienced by DISH community members, The Texas Department of State Health Services should, at a minimum, test the blood of community members for a Comprehensive Metabolic Panel, Hepatic Profile and CBC. In addition, the Health Agency should be requested to evaluate the exposure of residents through the use of biomonitoring parameters for the chemicals of concern in the blood and urine of current and past DISH residents. The overall health impacts being experienced by DISH residents (past and present) should be tracked over time through surveys and follow up consultations.

The Texas Commission on Environmental Quality should establish a process of documenting Odors and Symptoms should be established by which community members can document odor events and associated health impacts. The Odor and Symptom Logs should contain reporting of date, time, location, description of odors, wind speed and direction, health impacts, associated with the odor events, possible sources of the odors, duration of the odor event and duration of health impacts

Increased tracking of operational upsets, spills, releases and permit violations of the compressor stations, gas processing stations, gas metering stations, wells and pipelines in the DISH area should also be put in place by the Texas Commission on Environmental Quality and the Texas Railroad Commission.

A continuous monitoring network should be established by the Texas Commission on Environmental Quality to monitor speciated Volatile Organic Chemicals, Hazardous Air Pollutants, Sulphur compounds and meteorological conditions in the DISH area.

The recommended measures are needed to further define the negative human health impacts being experienced by DISH community members, address appropriate medical intervention and treatment, identify the specific sources of the chemical emissions and pathways of human health exposure, and implement measures needed to reduce chemicals being emitted into the air of the DISH area.